

IRREGULARITIES BY ~~ULTRASONIC FORGING~~, by Alan Wood,
David Hembree and Warren Farnworth, and";

line 14, delete " ~~s.n. 7/898,625~~" and
substitute --No. 5,249,450--.

Page 23,

line 18, change "is" to --to be--;

line 21, delete --95--;

line 22, change "a" to --the--;

line 22, change "97" to --81--.

In the Claims

SUB E/F
44. (amended) An attachment member for use with a ~~testing apparatus for testing semiconductor integrated circuit die~~, said attachment member adapted for establishing ohmic connections with contact [points] locations on the die, comprising:

a) a substrate having a plurality of contacts formed thereon [to establish electrical communication with contact locations on the die];

b) the contacts [being] projecting from a surface of the substrate and positioned so that the contacts may be placed in alignment with the contact locations on the die [and extending to the contact locations]; [and]

c) [the] each contact[s] [being] formed with at least one raised portion, [the] each raised portion extending [sufficiently] from a surface of the contact and adapted to [that it may] penetrate [its] a respective contact location on the die for, [thereby] establishing [electrical

communication] an ohmic contact [with] at said contact location, said [extension of the] contact and raised portion [being limited] formed and dimensioned so that, when a predetermined force is applied to the contact, the raised portion [is significantly less than a force required for portions of the contacts outside of the raised portion to] will penetrate its respective contact location, while the contact abuts the contact location, thereby limiting penetration depth [of the contacts] at the contact location[.];

d) a plurality of conductive traces formed on the substrate and connected to the contacts; and

e) means for providing an electrical path between the conductive traces and leads of the testing apparatus.

45. (amended) An attachment member for use with a semiconductor integrated circuit die as described in claim 44, [further comprising] and wherein:

said contacts are formed as bumps and each [said one] raised portion is formed as an asperity [extending so as to penetrate to less than 2/3 of a thickness of its respective contact location on the die].

46. (amended) An attachment member for use with a semiconductor integrated circuit die as described in claim 44, [further comprising] and wherein:

said contacts are formed as bumps and each [said one] raised portion is formed as a point [extending so as to penetrate to less than 1/2 of a thickness of its respective contact location on the die].

*CN
Concl*

47. (amended) An attachment member for use with a semiconductor integrated circuit die as described in claim 44, [further comprising] and wherein:

[said one raised portion extending so as to penetrate to less than 2/3 of a thickness of its respective contact location on the die and said one raised portion extending at least 5000Å.]

said substrate is formed of a material selected from the group of materials consisting of silicon, germanium, silicon on sapphire, silicon on glass and a ceramic.

Please cancel claim 50.

51. (amended) An attachment member for use in [discrete] testing apparatus for testing a semiconductor integrated circuit device [in] formed as a discrete die [form], comprising:

a) a substrate having a plurality of contacts projecting from a surface of the substrate [to establish electrical communication with contact locations on the die];

b) circuit traces formed on the substrate, said circuit traces connected [extending] to said contacts;

c) the plurality of contacts being positioned so that the die and substrate can be placed in the testing apparatus with the contacts [are] in alignment with contact locations on the die; [and extending to the contact locations; and]

~~d) [the plurality of contacts being formed with] at least one raised portion on each contact, [the] each raised portion projecting from a surface of the contact on which it is formed; [extending sufficiently that it may penetrate its respective contact location on the die, thereby establishing electrical communication with said contact location, said extension of the raised portion being limited so that, when a force is applied to the raised portion is significantly less than a force required for portions of the contacts outside of the raised portion to penetrate its respective contact location, thereby establishing ohmic connections with contact points into the die at the contact locations of the die.]~~

~~e) a pad which is electrically conductive in a Z-axis, normal to a plane of the pad, and which provides electrical isolation across the plane of the pad, the pad, adapted to be positioned between the die and the plurality of contacts so that upon application of a biasing force to the substrate and the die, the contacts and raised portions will force the pad against the contact locations on the die for establishing electrical communication with the contact locations; and~~

~~f.) substrate bondpads formed on the substrate and connected to the circuit traces for attaching bond wires in electrical communication with the circuit traces and contacts.~~

52. (amended) An attachment member for use with a semiconductor integrated circuit die as described in claim 51, [further comprising] and wherein:

said contacts are formed as bumps and each [said one] raised portion is formed as an asperity [extending so as to

~~penetrate to less than 2/3 of a thickness of its respective contact location on the die].~~

53. (amended) An attachment member for use with a semiconductor integrated circuit die as described in claim 51, [further comprising] and wherein:

~~said contacts are formed as bumps and each [said one] raised portion is formed as a point [extending so as to penetrate to less than 1/2 of a thickness of its respective contact location on the die].~~

54. (amended) An attachment member for use with a semiconductor integrated circuit die as described in claim 51, [further comprising] and wherein:

~~[said one raised portion extending so as to penetrate to less than 2/3 of a thickness of its respective contact location on the die and said one raised portion extending at least 5000Å.]~~

~~said substrate is formed of a material selected from the group of materials consisting of silicon, germanium, silicon on sapphire, silicon on glass and a ceramic.~~

~~Please cancel claims 57-70.~~

C3 Sub 1
Cont'd
72. (added) An attachment member for electrically connecting a discrete semiconductor die to a testing apparatus, said attachment member comprising:

~~a substrate formed of a semiconductor material;~~

350

a contact formed on the substrate corresponding to a bondpad on the die, said contact projecting from a surface of the substrate and including at least one raised portion, said contact and raised portion formed and dimensioned such that upon application of a predetermined biasing force the raised portion will pierce the bondpad to establish an ohmic contact therewith while the contact abuts the bondpad to limit penetration of the raised portion and prevent damage to the bondpad;

a conductive trace formed on the substrate and connected to the contact; and

a substrate bondpad formed on the substrate and connected to the conductive trace for attaching a bond wire in electrical communication with the contact.

73. (added) The attachment member as claimed in claim 72 and wherein the contact is formed as a bump and the raised portion is formed as an asperity.

74. (added) The attachment member as claimed in claim 72 and wherein the contact is formed as a bump and the raised portion is formed as a pointed projection.

75. (added) The attachment member as claimed in claim 72 and wherein the substrate is formed of a material selected from the group of materials consisting of silicon, germanium, silicon on sapphire, silicon on glass and a ceramic.

76. (added) The attachment member as claimed in claim 72 and wherein the substrate is flexible.